UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/516,171	02/29/2000	Mark Burton	Q58064	1951

7590	09/30/2004	

Sughrue Mion Zinn Macpeak & Seas
2100 Pennsylvania Avenue NW
Washington, DC 20037-3202

EXAMINER
HA, DAC V

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 09/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.		Applicant(s)
Office Action Summary	09/516,171		BURTON, MARK
	Examiner		Art Unit
	Dac V. Ha		2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _08/09/04_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-22_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-22_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   This office action is in response to the amendment filed on 08/09/04.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   **Claims 1, 2, 7, 8, 10, 11-13, 18, 19, 21, 22** are rejected under 35 U.S.C. 103(a)

as being unpatentable over the admitted prior art (Instant application, on page 1, line 9

to page 2, line 20; Fig. 1) in view of Crebouw (US 5,090,028).

Regarding claim 1, the admitted prior art (Instant application, on page 1, line 9

to page 2, line 20; Figure 1) teaches the following claimed subject matter.

"detecting a frequency correction burst by scanning of a wanted channel;" (Figure

1, element 401)

"providing time and frequency synchronizations by using said frequency

correction burst;" (Figure 1, element 402)

"receiving a synchronization burst;" (Figure 1, element 403)

"equalizing the received synchronous burst;" (Figure 1, element 404)

"providing time and frequency synchronizations again by using said corrected

frequency correction burst" (Figure 1, element 405)

The admitted prior art differs from the claimed invention in that it does not teach the

claimed subject matter "cross correlating received training sequence contained in said

synchronous burst with a selected subset of an expected training sequence to obtain a channel estimate; deriving a frequency error estimate from said channel estimate; correcting the frequency error of the received burst in accordance with said frequency error estimate".

The attention is now directed to Crebouw's patent. Crebouw discloses a Method Of And Apparatus For Synchronization By Means Of Correlation, which suggests the teaching of the claimed subject matter "cross correlating received training sequence contained in said synchronous burst with a selected subset of an expected training sequence to obtain a channel estimate; deriving a frequency error estimate from said channel estimate; correcting the frequency error of the received burst in accordance with said frequency error estimate" as followed.

Crebouw suggests the teaching of the claimed subject matter "cross correlating received training sequence contained in said synchronous burst with a selected subset of an expected training sequence to obtain a channel estimate" in that, the sync data, which is formatted into frame and transmitted to the receiver, includes synchronization sequence, SQ, which is known to and stored at the receiver (Figure 2; Col. 1, line 50; Col. 2, lines 12-14; Figure 3, element 60; Col. 3, lines 22-24). The synchronization sequence, SQ, thus teaches the "training sequence contained in said synchronous burst". The known SQ is divided into parts and the selected part is correlated with the SQ in the received data (Col. 3, lines 24-29). The correlation results thus produce the "channel estimate" (Col. 3, lines 30-32).

Crebouw further suggests the teaching of the claimed subject matter "deriving a

frequency error estimate from said channel estimate; correcting the frequency error of

the received burst in accordance with said frequency error estimate" in that, the

correlation results are processed by element 66 of Figure 3 to produce output 68.

Therefore, the output 68 teaches "a frequency error estimate". The output 68 from the

error calculator is utilized to correct the frequency shift from the received data (Figure 5,

element 80). As a result, the total correlation of the received data (Figures 3, 5,

elements 72, 74) will be effected under advantageous conditions because the frequency

shift has already been corrected (Col. 4, lines 6-14).

In summary, Crebouw discloses a method for utilizing the partial correlation

results for correcting the received data (Figure 1, elements 50, 25) before performing

the equalization on the received signal (Figure 1, element 29) so that equalization could

be performed on the corrected data (Col. 5, lines 28-29).

Therefore, it would have been obvious to a person of ordinary skill in the art at

the time of the invention to incorporate the technique of correlating parts of the known

synchronization sequence stored at the receiver with the received data, then utilizing

such correlation results for correcting the frequency shift of the received data, as taught

by Crebouw, into the admitted prior art teaching of synchronization, particularly between

the step of correlating the received training sequence with the expected training

sequence (Figure 1, element 403) and the step of equalization (Figure 1, element 404),

to provide the benefit of accurately obtaining synchronization between the transmitter

and receiver since the frequency shift, which may be caused by Doppler effect (Col. 3,

lines 4-8), has been corrected before performing total correlation. And further,

equalization could be performed on the corrected data (Col. 5, lines 28-29), thus

improving the quality of the final output of the received signal.

Regarding claim 2, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 2, as applied to claim 1 above.

Further, the admitted prior art suggests the teaching of the claimed subject matter

"wherein the received training sequence is part of the signal within a synchronization

burst transmitted by a base station of a cellular telephone network" in the instant

application on page 1, line 19 to page 2, line 2. That is, as indicated above (page 4,

paragraph 1), the combination of the admitted prior art and Crebouw's patent teaches

"the received training sequence is part of the signal within a synchronization burst". The

admitted prior art, on page 1, line 19 to page 2, line 2, teaches that the mobile terminal

synchronizes with the base station transmission via a broadcast control channel, which

is transmitted by the base station.

Regarding claim 7, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 7, as applied to claim 1 above.

Crebouw further suggests the teaching of the claimed subject matter "wherein the

selected subset is an adaptive subset" in that, the SQ could be divided into 8 parts

(Figure 3, elements 60; Col. 3, lines 22-23) or two parts (Figure 6, element 60'; Col. 4,

liens 64-65).

Regarding claim 10, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 10, as applied to claim 1 above.

Crebouw further suggests the teaching of the claimed subject matter "wherein the

frequency error estimate is obtained by a Doppler tracking phase locked loop" as

followed. The "frequency error estimate" (Figure 3, element 68) is subsequently utilized

to correct the frequency shift in the received data of the next period (Col. 4, lines 6-14;

Figure 7; Col. 5, lines 19-26). This "frequency error estimate" is utilized to consequently

produce a final error (Figure 1, element 44; Col. 4, lines 4, lines 60-62) to use as part of

the loop for tracking the frequency differences, which may be caused by Doppler effect

(Figure 1, elements 44, 46, 20; Col. 3, lines 1-9).

Regarding claim 8, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 8, as applied to claim 2 above.

Crebouw further suggests the teaching of the claimed subject matter "wherein the

selected subset is an adaptive subset" in that, the SQ could be divided into 8 parts

(Figure 3, elements 60; Col. 3, lines 22-23) or two parts (Figure 6, element 60; Col. 4,

lines 64-65).

Regarding claim 11, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 11, as applied to claim 2 above.

Crebouw further suggests the teaching of the claimed subject matter "wherein the

frequency error estimate is obtained by a Doppler tracking phase locked loop" as

followed. The "frequency error estimate" (Figure 3, element 68) is subsequently utilized

to correct the frequency shift in the received data of the next period (Col. 4, lines 6-14;

Figure 7; Col. 5, lines 19-26). This "frequency error estimate" is utilized to consequently

produce a final error (Figure 1, element 44; Col. 4, lines 4, lines 60-62) for use as part of

the loop for tracking the frequency differences, which may be caused by Doppler effect

(Figure 1, elements 44, 46, 20; Col. 3, lines 1-9).

Regarding apparatus claims 12, 13, 18, 19, 21, 22, see method claims 1, 2, 7,

8, 10, 11 above, respectively.

4.   **Claims 3, 4, 14, 15** are rejected under 35 U.S.C. 103(a) as being unpatentable

over the admitted prior art in view of Crebouw as applied to claim 2 above, and further

in view of Ranta (US 5,838,672).

Regarding claim 3, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 3, as applied to claim 2 above,

except for the claimed subject matter "wherein the received training sequence is the 64

bit training sequence of the GSM system".

The attention is now directed to Ranta's patent. Particularly, Ranta teaches the

claimed subject matter "the received training sequence is the 64 bit training sequence of

the GSM system" in Col. 1, lines 42-45; Col. 2, lines 26-28; Figure 1.

In the same field of endeavor, Ranta discloses a method for measuring the timing

of a received signal. More particularly, the measurement is achieved by correlating the

training sequences transmitted from the base station to the mobile station in the GSM

system with the training sequence at the mobile station (Col. 2, lines 26-28; Col. 3, lines

17-25; Col. 4, lines 6-8).

Therefore, a person of ordinary skill in the art at the time of the invention would

have motivated to modify the synchronization sequence, SQ, as taught in the

combination of the admitted prior art and Crebouw, to include "the 64 bit training

sequence of the GSM system" to provide a synchronization burst compatible with, i.e.

GSM system, so that the advantage of the frequency shift being corrected before

equalization, as taught the combination of the admitted prior art and Crebouw, could be

exploited for such application as GSM system since GSM is becoming more and more

common today.

Regarding claim 4, the combination of the admitted prior art, Crebouw and

Ranta patents teaches the claimed subject matter in claim 4, as applied to claim 3

above, except for the claimed subject matter "wherein the selected subset comprises

the 21st through 44th symbols of the training sequence".

Ranta teaches that the training sequence is the 64 bit training sequence of the

GSM system. The training sequence is contained in the synchronization burst (Figure

1). Crebouw teaches that the "training sequence" (SQ) could be divided into 8 parts

(Figure 3, element 60) merely as an illustration. A person of ordinary skill in the art

would have recognized that the "training sequence" (SQ) could have been divided into

any number of parts. The purpose of the synchronization burst is to synchronize the

mobile station to the frame structure of the base station (Ranta, Col. 1, lines 49-51).

This includes time and frequency. Under the condition of noise and/or interference, to

achieve the best result of the correlation with the received signal, a middle part of the

training sequence would have provided the best estimate of time and frequency. That

is, in estimating the time and frequency, the time is shifted one way or another, thus the

middle part of the training sequence is most likely to be correctly detected for frequency

than that at or closer to the boundary of the training sequence. As a result, the middle

part could have comprised "the 21st through 44th symbols of the training sequence",
which would be the optimum for frequency estimate.

Therefore, it would have been obvious to a person of ordinary skill in the art at
the time of the invention to divide the training sequence, taught by the combination of
the admitted prior art, Crebouw and Ranta patents, into, for example 3 or 5 parts, so
that the correlation of the middle part of the training sequence with the received signal
would ensure the best estimate of the frequency detection use for synchronization.
Thus, the accuracy and the speed of the synchronization detection are improved.

Regarding apparatus claims 14, 15, see method claims 3, 4 above,
respectively.

5.   **Claims 5, 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over the
admitted prior art in view of Crebouw as applied to claim 1 above, and further in view of
Malkamaki et al. (US 5,479,444) (hereinafter Malkamaki).

Regarding claim 5, the combination of the admitted prior art and Crebouw's
patent teaches the claimed subject matter in claim 5, as applied to claim 1 above,
except for the claimed subject matter "wherein the training sequence is an adaptive
training sequence"

The attention is now directed to Malkamaki's patent. Malkamaki discloses a
Training Sequence In Digital Cellular Radio Telephone System, which teaches the
claimed subject matter "the training sequence is an adaptive training sequence" in that
the training sequence is used for calculation of the impulse response of the channel.

The training sequence is advantageously made adaptive so as to enhance the quality of

the connection (Abstract; Col. 3, lines 59-62; Col. 4, lines 16-29).

The combination of the admitted prior art and Crebouw's patent utilizes the

synchronization sequence (or synchronization burst) for combating the fluctuation and

disturbance from the channel (Crebouw, Col. 2, lines 6-10) and/or channel estimation

(Instant application, page 2, lines 3-4).

Therefore, it would have been obvious to a person of ordinary skill in the art at

the time of the invention to incorporate the use of "an adaptive training sequence"

taught by Malkamaki into the synchronization sequence (SQ) of the combination of the

admitted prior art and Crebouw's patent so as to make the synchronization sequence

adaptive. As a result, the system can be adaptive to vary from situation to situation (i.e.

in city areas where multiple path propagation of a signal is dominating versus in the

countryside) such that a better and faster estimate of the channel can be made.

Regarding apparatus claim 16, see method claim 5 above.

6.   **Claims 6, 9, 17, 20** are rejected under 35 U.S.C. 103(a) as being unpatentable

over the admitted prior art in view of Crebouw as applied to claim 2 above, and further

in view of Malkamaki.

Regarding claim 6, the combination of the admitted prior art and Crebouw's

patent teaches the claimed subject matter in claim 6, as applied to claim 2 above,

except for the claimed subject matter "wherein the training sequence is an adaptive

training sequence"

The attention is now directed to Malkamaki's patent. Malkamaki discloses a

Training Sequence In Digital Cellular Radio Telephone System, which teaches the

claimed subject matter "the training sequence is an adaptive training sequence" in that

the training sequence is used for calculation of the impulse response of the channel.

The training sequence is advantageously made adaptive so as to enhance the quality of

the connection (Abstract; Col. 3, lines 59-62; Col. 4, lines 16-29).

The combination of the admitted prior art and Crebouw's patent utilizes the

synchronization sequence (or synchronization burst) for combating the fluctuation and

disturbance from the channel (Crebouw, Col. 2, lines 6-10) and/or channel estimation

(Instant application, page 2, lines 3-4).

    Therefore, it would have been obvious to a person of ordinary skill in the art at

the time of the invention to incorporate the use of "an adaptive training sequence"

taught by Malkamaki into the synchronization sequence (SQ) of the combination of the

admitted prior art and Crebouw's patent so as to make the synchronization sequence

adaptive. As a result, the system can be adaptive to vary from situation to situation (i.e.

in city areas, where multiple path propagation of a signal is dominating, versus in the

countryside) such that a better and faster estimate of the channel can be made.

    Regarding claim 9, the combination of the admitted prior art and Crebouw's

patent and Malkamaki's patent teach the claimed subject matter in claim 9, as applied to

claim 6 above. Crebouw further suggests the teaching of the claimed subject matter

"wherein the selected subset is an adaptive subset" in that, the SQ could be divided into

8 parts (Figure 3, elements 60; Col. 3, lines 22-23) or two parts (Figure 6, element 60;

Col. 4, lines 64-65).

Regarding apparatus claims 17, 20, see method claims 6, 9above,

respectively.

Response to Arguments

7.   Applicant's arguments filed 08/09/04 have been fully considered but they are not

persuasive.

In the REMARKS, pages 8-9, applicant has argued "Independent claim 1 recites

(among other things) cross correlating a received training sequence with a selected

subset of an expected training sequence. At least these features are absolutely absent

from the prior art relied upon in the grounds of rejection. The grounds of rejection

compare the correlation method of Crebouw to the above-noted features of independent

claim 1. Entirely lacking in Crebouw, however, is any type of training sequence.

Indeed, ... expected training sequence."

Even though Crebouw does not teach the term "training sequence", the grounds

of rejection is based on the functional equivalency, in general, between the claimed

"training sequence" and the sync data of Crebouw. Conventionally, a "training

sequence", which is also known to the receiver, is utilized for initialization of the system

by comparing the received "training sequence" with a know "training sequence" stored

at the receiver. Likewise, the sync data Crebouw is utilized for the same purpose.

In the REMARKS, page 9, applicant has argued "Moreover, there is no motivation to combine Crebouw with the instant application ... 1985)."

Both, the admitted prior art and Crebouw deal with method for synchronization. Particularly, Crebouw discloses an improved method for synchronization in a manner that frequency shift is corrected prior to providing the data to sub-sequence stages for processing (i.e., equalizing stage). Synchronization is an essential process in communication, particularly the initial step for acquiring synchronization. The more accurate the system can initialize, the faster and better the synchronization has become. Also, equalization is often used in communication system for improving quality of the received signal. Therefore, a person of ordinary skill in the art at the time of the invention would have been motivated to incorporate the improved synchronization teaching from Crebouw, into the admitted prior art teaching of synchronization, as such equalization could have been performed on corrected data, as a result, the quality of the final output of the received signal if further improved.

Pages 9-10, applicant has argued "Claims 3 and 4 are at least patentable because "[i]f an independent claim is nonobvious ... claims 3 and 4 are also nonobvious. Additionally, ... (at least by virtue of their dependency upon claim 1) ... that the combination of the Applicant-admitted prior art with Crebouw is improper because there is no motivation or suggestion to combine."

Since there would have been a motivation for the combination of the admitted prior art and Crebouw, as indicated above, the rejection of claim 1 is proper, and therefore, the rejection of claims 3 and 4 is also proper.

Page 10 of the REMARKS, applicant has argued "Claim 5 is at least patentable because "[i]f an independent claim is nonobvious ... therefrom is nonobvious. Additionally, ... that the combination of the Applicant-admitted prior art with Crebouw is improper because there is no motivation or suggestion to combine."

Since there would have been a motivation for the combination of the admitted prior art and Crebouw, as indicated above, the rejection of claim 1 is proper, and therefore, the rejection of claim 5 is also proper.

Page 11 of the REMARKS, applicant has argued "Claims 6 and 9 are at least patentable because "[i]f an independent claim is nonobvious ... therefrom is nonobvious. Additionally, ... that the combination of the Applicant-admitted prior art with Crebouw is improper because there is no motivation or suggestion to combine."

Since there would have been a motivation for the combination of the admitted prior art and Crebouw, as indicated above, the rejection of claim 1 is proper, and therefore, the rejection of claims 6 and 9 is also proper.

Conclusion

8.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Dac V. Ha whose telephone number is 571-273-3040.

The examiner can normally be reached on 5/4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for

the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Dac V. Ha
Examiner
Art Unit 2634